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A NEW FACTOR ANALYSIS OF THE SVIB--SUGGESTED MODIFICATION OF EXISTING GROUPS AND IMPLICATIONS FOR COUNSELING.

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FACTOR ANALYSIS WAS CARRIED OUT TO ASCERTAIN THE BEST OCCUPATIONAL GROUP LOCATION FOR EACH OF FOUR STRONG VOCATIONAL INTEREST BLANK (SVIB) SCALES--VETERMINARIAN, SENIOR CPA, PHARMACIST, AND MORTICIAN. THE SVIB WAS ADMINISTERED TO 125 MALE LIBERAL ARTS FRESHMEN. MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS WERE COMPUTED. THIS FACTOR ANALYSIS STUDY, TOGETHER WITH RESULTS FROM OTHER STUDIES, INDICATES THAT THE SENIOR CPA SCALE IS CORRECTLY PLACED IN GROUP VII. THE DATA INDICATE, HOWEVER, THAT PHARMACIST AND MORTICIAN DO NOT BELONG IN GROUP VII. THE INVESTIGATORS BELIEVE THAT THEY SHOULD CONSTITUTE A NEW GROUP, TENTATIVELY LABELED GROUP VIIIA. THEY INDICATE ALSO, THAT VETERINARIAN DOES NOT SEEM TO BELONG IN GROUP I. THEY BELIEVE THAT IT IS BETTER PLACED AS A SINGLE SCALE-FAMILY, TENTATIVELY LABELED GROUP IVA. THIS PAPER WAS PRESENTED AT THE AMERICAN PERSONNEL AND GUIDANCE ASSOCIATION CONVENTION (DETROIT, APRIL 1968). (CG)

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A New Factor Analysis of the SVIB: Suggested Modification of Existing Groups and Implications for Counseling

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The primary objective of this study was to ascertain by means of factor analysis, the best location, in terms of occupational Groups for each of four Strong Vocational Interest Blank (SVIB) scales: Veterinarian, Senior CPA, Pharmacist, and Mortician.

Background

Factor analysis of the intercorrelations among the occupational scales of the SVIB (Men) has made possible the classification of single occupational scales into major groupings according to their similarity (Strong, 1959). However, several scales have been added to the SVIB since Strong's major factor analyses were completed. According to Strong (1951, p.11), "Veterinarian has been assigned to Group I, and senior certified public accountant, pharmacist, and mortician to Group VIII, on the basis of rather meagre data." The same statement appears in the 1959 Manual (Strong, 1959, p.7).[1]

(Although Strong did report some correlations for the Senior CPA scale (Strong, 1949) no mention of these data was made in either of the two Manuals.)

Darley and others (Cronbach, 1960; Darley & Hagenah, 1955; Layton, 1958) have advocated interpreting the SVIB in terms of occupational Groups (e.g., Group I, Group II) as contrasted to the single-

[1]This study was undertaken before the 1966 revision was available.

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scale approach. Because of the popularity of the Group interpretation i.e., pattern analysis, it seemed appropriate to contribute further information on the suitability of the location of several scales in their respective groups.

Probably the best known factor analysis study involving the SVIB is the one by Cottle (1950). His study used six Group scale scores; hence, in general it is of limited usefulness in terms of providing information concerning the factor loadings of the individual scales. Anderson and Anker (1964) report a factor analysis study of SVIB and MMPI scores for a psychiatric population. They used "11 group scores of the SVIB and 3 nonoccupational scales of the SVIB." Hence, factor loadings for the four scales in question in this study were not available.

Prior to the year (1965) in which the present study was begun, apparently no factor analysis study of the SVIB had been published other than those reported by Strong (1943) which provided factor loadings for individual scales. Since the beginning of the study, Siess and Jackson (1967) have reported a factor analysis study involving the SVIB and a personality inventory, namely the Personality Research Form. The authors do not indicate whether the 1966 revision of the SVIB or the older form was used. In their paper, Siess and Jackson do report factor loadings for selected single occupational scales. (Their results are discussed in this paper in the section, "Discussion")

Method

The subjects were 125 male liberal arts freshmen at Alfred University. The SVIB was administered in September 1964 as a part of

the freshman orientation program.

Means, standard deviations, and intercorrelations were computed. The factor analysis program which was used was one which was on file in the computing center at the State University of New York at Buffalo. The varimax rotation was used. In order for a factor to be considered, an eigenvalue of greater than 1.00 was required.

Results

Seven factors emerged. The factor loadings for each of SVIB scales are presented in Table 1. Except for the four scales in question--Veterinarian, Senior CPA, Mortician, and Pharmacist--factor loadings of less than .20 have been omitted.

In Table 2, the means, standard deviations, and intercorrelations for the scales in Groups I and VIII are presented.

The Veterinarian scale has a loading of .02 on Factor 3. In contrast, the other six scales in Group I have loadings ranging from .33 to .71; four of the six are .62 or above. Four of the scales in Group I--Psychologist, Architect, Physician, and Dentist--have their highest loadings on Factor 3. The Veterinarian scale has its highest loading on Factor 5 (.57), although its loading on Factor 1 is nearly identical (.56).

All the scales in Group IV have "moderate to high" loadings on Factor 1, the values ranging from .59 to .87. Of the remaining scales, the Veterinarian scale has the highest positive loading (.56) on Factor 1. It seems that Veterinarian is more similar to scales in Group IV than to scales in Group I.

The scales which have the highest (absolute) loadings on Factor 4 are five scales in Group VIII--Senior CPA (-.74), Accountant (-.86),

Table 1

Factor Loadings* of SVIB Occupational Scales on Seven Factors for a Sample of 125 Male Liberal Arts Freshman, Alfred University-1964 (Factor Loadings for the Varimax Rotation)

	SVIB Scale	FACTOR 1	2	3	4	5	6	7
I	1. Artist	-.20		.48	.47		-.63	
	2. Psychologist		.46	.62	.47			
	3. Architect			.71	.24		-.44	
	4. Physician	.27	.23	.70	.38	.39		
	5. Osteopath	.43	.29	.33	.30	.62		
	6. Dentist	.37		.64	.23	.47		
	7. Veterinarian	.56	-.20	.02	.35	.57	.13	-.06
II	8. Mathematician		-.33	.84				
	9. Physicist		-.29	.84				
	10. Engineer	.39	-.35	.71				.28
	11. Chemist	.38	-.21	.83				
III	12. Production Mgr	.37	-.49				.64	.24
IV	13. Farmer	.77	-.42	.27				
	14. Aviator	.78		.33				.31
	15. Carpenter	.77	-.27	.30				
	16. Printer	.59	.33	.22	-.30		-.39	
	17. Math Sci Tchr	.63	.34	.45	-.29			-.23
	18. Ind Arts Tchr	.77		.27				
	19. Voc Agri Tchr	.77						-.22
	20. Policeman	.76	.32		-.21			
	21. Forest Service	.87						
V	22. YMCA Phys Dir	.45	.65		.27		.33	
	23. Personnel Dir		.88		-.27			
	24. Public Admin		.87		-.29			
	25. YMCA Secretary		.89	-.29				
	26. Soc Sci Tchr		.85	-.35	-.24			
	27. City School Su	-.20	.88					
	28. Social Worker		.94					
	29. Minister		.90					-.23
VI	30. Musician (Perf)		.64	.30	-.20		-.58	
VII	31. CPA	-.51	.39		-.60			
VIII	32. Senior CPA	.30	.50	.13	-.74	.01	.00	.03
	33. Accountant		.25		-.86		.24	
	34. Office Man		.34	-.31	-.81			
	35. Purch. Agent			-.35	-.85			.20
	36. Banker			-.52	-.72			
	37. Mortician	-.03	-.15	-.68	-.02	.40	.23	.11
	38. Pharmacist	-.03	-.11	-.19	-.35	.78	.00	.06
IX	39. Sales Manager	-.44		-.67				.39
	40. Real Est Slsmn	-.46		-.73				
	41. Life Ins Slsmn	-.54		-.69				
X	42. Advertising Man	-.66		-.27	.28		-.40	.23
	43. Lawyer	-.67	.38				-.31	
	44. Author-Journal.	-.58					-.65	.21
XI	45. Pres Mfg Concern	-.45	-.29		-.28			.57
	46. Interest Maturity	-.25	.75	.29				.24
	47. Occupatnl Level		.79		-.41			
	48. Masc-Fem	-.54	.27		-.48		-.31	.22

* Factor loadings of less than .20 have been omitted.

Table 2

Means, Standard Deviations, and Intercorrelations for the SVIB Scales in Group I and Group VIII, Based on a Sample of 125 Liberal Arts Freshmen, Alfred University, 1964
(Decimal points omitted)

			$\bar{x}$	SD	Group I							Group VIII						
					1	2	3	4	5	6	7	8	9	10	11	12	13	14
I	1	Artist	26	9		53	81	47	15	42	-04	-43	-61	-63	-50	-52	-40	-25
	2	Psychologist	29	11			51	74	42	35	02	-01	-31	-44	-67	-61	-47	-30
	3	Architect	25	10				55	17	60	04	-17	-35	-49	-39	-54	-55	-31
	4	Physician	33	13					78	79	50	04	-33	-43	-59	-65	-40	00
	5	Osteopath	29	11						72	66	09	-20	-14	-38	-46	00	23
	6	Dentist	26	11							59	-08	-30	-36	-38	-60	-26	15
	7	Veter'n	22	11								-15	-35	-30	-28	-36	20	31
VIII	8	Sr. CPA	32	13									82	77	54	49	-16	20
	9	Account	23	13										88	71	63	08	22
	10	Office Man	28	13											75	77	26	34
	11	Purch Agent	25	12												78	31	48
	12	Banker	26	11													33	32
	13	Mortician	29	8														49
	14	Pharmacist	32	9														

Office Man (-.81), Purchasing Agent (-.72), and Banker (-.72). The other two scales in Group VII, Mortician and Pharmacist, have much lower loadings on Factor 4; the Mortician loading is -.02, and the Pharmacist loading is -.35.

On Factor 5, the Pharmacist scale has a loading of .78. This is the highest loading of any of the scales on Factor 5. Mortician has a loading of .40 on Factor 5. In contrast, the other five scales in Group VIII have very low loadings on Factor 5, ranging from -.08 to .07.

Discussion

On the basis of the factor loadings in Table 1, it appears that the Veterinarian scale is not measuring the same thing as are the majority of scales in Group I. The Veterinarian scale has a factor loading of .02 with Factor 3, whereas the other six scales have factor loadings ranging from .33 to .71. Five of these other six scales in Group I have their highest loadings on Factor 3 whereas the Veterinarian scale has its highest loading (.57) on Factor 5, and the Osteopath scale has its highest loading (.62) on Factor 5.

On the basis of the factor loadings in Table 1 it appears that the Senior CPA scale is measuring a factor which is common to the majority of the scales in Group VIII. The Senior CPA scale has its highest loading on Factor 4, as do Accountant, Office Man, Purchasing Agent, and Banker.

In contrast, the Mortician and Pharmacist scales do not appear to belong in Group VIII. Compared to the absolute values of the loadings of the other five scales the Mortician and Pharmacist have low loadings; each has its highest loading on some other factor. It is noteworthy that the results of this factor analysis study give some support

to Strong's prophecy that the Mortician and Pharmacist scales would "eventually be assigned to a group intermediate between VIII and IX" (Strong, 1959, p.7).

Although larger and more heterogeneous samples are needed to determine to what extent the present results are generally valid, evidence from some other studies supports the results of this investigation.

For two samples of medical students, Smith (1960) computed the intercorrelations among all the SVIB scales. The results for both samples were quite similar. On the basis of the intercorrelations obtained from these samples, the Veterinarian scale did not appear to be measuring a common interest factor with the other scales in Group I. Also, on the basis of the intercorrelations for the seven scales in Group VIII, it appeared that Senior CPA and four other scales were measuring a common factor, whereas the Pharmacist and Mortician scales were not.

Campbell (1965) has presented the individual SVIB profiles of 50 APA presidents together with the average (mean) scores. The 50 psychologists obtained mean scores on the scales in Group I as follows: Artist, 37; Psychologist, 50; Architect, 40; Physician, 45; Osteopath, 33; Dentist, 33; and Veterinarian, 11. The psychologists made their lowest mean score of the entire SVIB on the Veterinarian scale.

Strong did not report intercorrelations for the Veterinarian, Sr. CPA, Mortician, and Pharmacist scales in the 1959 Manual nor in the 1951 Manual. Since this present study was undertaken, the new 1966 Manual has been published. Intercorrelations for these four scales are reported in the new Manual. However, because the 1966 Manual reports correlations based upon revised scales, whereas the scales

upon which this study is based are the "old" scales, some cautions are in order.

Nonetheless, the intercorrelations for the revised scales in the 1966 Manual (Campbell, 1966, pp. 37-39) are fairly similar to those found in this study, reported in Table 2. For example, the new Veterinarian scale correlates moderately high with Dentist (.60) and Osteopath (.63), somewhat less with Physician (.46), Artist (.18), and Architect (.19) and negatively with Psychologist (-.45). The Veterinarian scale correlates the highest with Farmer (.70). Campbell (1966, p.12) recognized the possibility that Veterinarian might be placed in Group IV:

> Other things being equal, occupations with similar educational requirements were grouped together. For example, groups with biological science backgrounds were left together, though there were suggestions in the data that other groupings could be used-the veterinarians were a more rugged, outdoors-oriented occupation than the other biological scientists, and might well have been grouped with the Technician and Skilled Trades occupations in Group IV.

The factor loadings obtained by Siess and Jackson (1967) seem to be generally similar to the factor loadings based on a Alfred University sample. The Siess and Jackson sample was comprised of 212 men who were enrolled in a beginning psychology course at University of Western Ontario. Direct comparisons of factor loadings are not possible because Siess and Jackson factor analyzed the SVIB and a personality test. Also, they did not use some of the scales included in the present study; e.g., they did not include the Mortician scale nor the Sr. CPA scale.

They reported that Forest Service, Farmer, Veterinarian, and Carpenter had "defining loadings" on their Factor IV. Although Veterinarian had its highest loading on Factor IV, the other Group I

scales had low or negative loadings on Factor IV in the Siess and Jackson study.

The factor loadings for the Pharmacist scale seem also to parallel the results obtained for the Alfred study. The Pharmacist scale had the highest loading of all the scales on Siess and Jackson's Factor VII; in the present study Pharmacist has the highest loading of all the scales on Factor 5.

The factor analysis data presented in Table 1 indicate that the Veterinarian scale is not measuring a factor more or less common to five of the other six scales in the Group I as it was described in the 1959 Manual. Of the three scales which were placed in Group VIII "on the basis of rather meagre data," only one-the Sr. CPA scale-appears to be correctly placed. Pharmacist and Mortician seem to be tapping a different portion of the interest domain. Evidence from other studies seems to support the findings for this Alfred sample.

What are the implications for counselors who use and interpret the SVIB? It appears to the writers that if scales which presently constitute a Group, e.g., Group I, do not all substantially measure a common factor, then to proclaim to counselees that they do is at best, inaccurate. Although Veterinarian looks like a biological science scale, the statistical data give slight support to that logical view. On the other hand, the factor analysis results, which are supported by the data in the 1966 Manual, offer the sensitive counselor an escape from the awkward composition of Group VIII. Mortician and Pharmacist do not seem to belong, on a common sense basis, to Group VIII. On the basis of the factor analysis data presented here, there is no statistical support for their placement in Group VIII. Campbell's data indicate the same thing. E.g.,the 1966

SVIB Manual reports a negative correlation (-.01) between Pharmacist and Accountant, two of scales placed together in Group VIII.

The pattern analysis approach is unmistakenly tied to the assumption that the people in the occupations represented in a given Group have substantially the same interests. For Group I and Group VIII, in reference to either the composition of the "old" SVIB, or to the composition of the 1966 version, the assumption that the people in member occupations have the same interests seems untenable on the basis of the statistical evidence. For these Groups at least, the pattern analysis approach has doubtful validity. Strong himself advocated interpreting the SVIB in terms of the whole profile (Strong, 1943, p.414).

Conclusions

The results of this factor analysis study, together with results from other studies, indicate that the Senior CPA scale is correctly placed in Group VIII. The data indicate that Pharmacist and Mortician do not belong in Group VIII; they probably should constitute a new Group, tentatively labeled Group VIIIa.

Veterinarian does not seem to belong in Group I. Rather than placing it in Group IV, it probably is better placed as a single-scale family, tentatively labeled Group IVa.

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